CLAIMS:

1. An optical system configured to provide a desired illuminating light pattern, the system comprising a light source system configured and operable to produce structured light in the form of a plurality of spatially separated light beams; and a beam shaping arrangement; the beam shaping arrangement being configured as a diffractive optical unit configured and operable to carry out at least one of the following: (i) combining an array of the spatially separated light beams into a single light beam thereby significantly increasing intensity of the illuminating light; (ii) affecting intensity profile of the light beam to provide the illuminating light of a substantially rectangular uniform intensity profile.

2. The system of Claim 1(i), wherein said diffractive optical unit comprises at least one inverse Dammann grating.

3. The system of Claim1(ii), wherein said diffractive optical unit comprises a tophat element assembly.

4. The system of Claim 3, wherein said tophat element assembly comprises an array of tophat elements arranged in accordance with an array of the spatially separated light beams, such that each of the tophat elements affects the corresponding one of the light beams.

5. The system of Claim 4, wherein the tophat element is configured to affect the intensity profile of the corresponding light beam to produce therefrom an illuminating light beam of the substantially rectangular intensity profile corresponding to a geometry of the entire surface to be illuminated.

6. The system of Claim 4, wherein the tophat element is configured to affect the intensity profile of the corresponding light beam to produce therefrom an illuminating light beam of the substantially rectangular intensity profile corresponding to a geometry of a single pixel from an array of pixels in a surface to be illuminated.

7. The system of Claim 4, wherein the tophat element is configured to affect the intensity profile of the corresponding light beam to produce therefrom

an illuminating light beam of the substantially rectangular intensity profile corresponding to a geometry of a sub-array from an array of pixels in a surface to be illuminated.

8. The system of Claim 1, wherein said light source system comprises a plurality of light source elements each producing the corresponding one of said light beams.

9. The system of Claim 1, wherein said light source system comprises at least one light source element generating at least one light beam; and a light splitting unit for splitting the at least one light beam into an array of the spatially separated light beams.

10. The system of Claim 1, comprising a focusing optics comprising a lens accommodated in optical paths of an array of the light beams to direct them along an optical axis of the lens.

11. The system of Claim 1, comprising a focusing optics comprising an array of lenses each in an optical path of the corresponding one of an array of the light beams.

12. The system of Claim 1, wherein said light source system comprises at least one pumping light source arrangement and at least one non-linear optical medium to be pumped by light generated by said at least one pumping light source arrangement.

13. The system of Claim 12, wherein the pumping light source arrangement comprises a surface emitting laser source for directly pumping the non-linear optical medium.

14. The system of Claim 12, wherein the pumping light source arrangement comprises a surface emitting laser source and a lasing crystal.

15. The system of Claim 12, wherein said at least one pumping light source arrangement comprises an array of surface emitting laser source elements.

16. The system of Claim 12, wherein said at least one pumping light source arrangement comprises an array of Vertical Cavity Surface Emitting Lasers (VCSELs).

17. The system of Claim 1, wherein said light source system comprises at least one light source element, said light source element being at least one of the following: light emitting diode (LED), laser die, Edge Emitting Laser, Surface Emitting Laser.

18. The system of Claim 9, wherein said light splitting unit comprises at least one multi-pixel diffractive optical phase mask, the mask being configured to produce from said at least one light beam an array of the spatially separated light beams.

19. The system of Claim 9, wherein said light splitting unit comprises a multi-pixel diffractive optical phase mask defining a first array of pixels, each of said pixels being configured as a second array of sub-pixels, thereby producing the spatially separated light beams arranged in accordance with said second array.

20. The system of Claim 9, wherein said light splitting unit comprises at least first and second multi-pixel diffractive optical phase masks accommodated in a spaced-apart relationship along an optical path of light propagation through the system, and defining different arrays of pixels, respectively, such that light passage through the first mask produces a first array of spatially separated light beams, and passage of said first array through the second mask produces a second array of an increased number of spatially separated light beams.

21. The system of Claim 9, wherein said light splitting unit comprises a Dammann grating assembly configured to produce from said at least one light beam an array of the spatially separated light beams.

22. The system of Claim 18, wherein said beam shaping arrangement comprises an array of tophat elements, each in the optical path of the corresponding one of the spatially separated light beams to produce therefrom a light beam of substantially rectangular and uniform intensity profile.

23. The system of Claim 9, wherein said light splitting unit comprises an array of Dammann grating assemblies arranged in a cascaded manner, such that each light beam output from one Dammann grating assembly is directed through

a successive Dammann grating assembly, thereby multiplying a number of the light beams produced by said one Dammann grating assembly.

24. The system of Claim 15, wherein the beam shaping arrangement comprises an inverse Dammann grating assembly for combining an array of the spatially separated light beams into the single combined light beam of significantly higher intensity value.

25. The system of Claim 24, wherein said inverse Dammann grating assembly is accommodated upstream of the non-linear optical medium with respect to a direction of light propagation through the optical system.

26. The system of Claim 24, wherein the beam shaping arrangement comprises a tophat element accommodated in an optical path of the combined light beam to produce the illuminating light beam of the substantially rectangular uniform intensity profile.

27. The system of Claim 15, wherein the beam shaping arrangement comprises an array of tophat elements accommodated at the output of the non-linear medium.

28. The system of Claim 15, comprising a multi-pixel diffractive optical phase mask accommodated in optical path of light output from the non-linear optical medium to produce an array of the spatially separated light beams, and an array of tophat elements accommodated in optical path of said array of the spatially separated light beams.

29. The system of Claim 1, comprising a control unit associated with the light source system, said control unit being preprogrammed to carry out a sequencing mechanism to thereby sequentially actuate a plurality of light source elements in accordance with a predetermined pattern.

30. The system of Claim 29, wherein said pattern is such that at any given time only one light source element is operative, and the entire light source system being seen to a human eye as constantly operative for a required operation time, thereby reducing over heating in a single area defined by the light source system.

31. The system of Claim 30, wherein said pattern is such that at any given moment of time the most distant light source element is operative relative to the light source element that was operative before it.

32. The system of Claim 29, wherein said pattern is such that at any given time only one group of light source elements is operative.

33. The system of Claim 15, comprising a control unit associated with the light source system, said control unit being preprogrammed to carry out a sequencing mechanism to thereby sequentially actuate the plurality of the light source elements in accordance with a predetermined pattern.

34. The system of Claim 33, wherein said pattern is such that at any given time only one group of light source elements is operative.

35. The system of Claim 1, wherein said light source system is configured to define at least two spatially separated optical paths, the light source system comprising at least two light sources operating in different wavelength ranges.

36. The system of Claim 35, wherein at least one of said light sources comprises a pumping light source arrangement and a non-linear optical medium.

37. The system of Claim 35, wherein the beam shaping arrangement comprises a tophat element assembly accommodated in one of the optical paths to allow passage of the spatially separated light beams therethrough and thereby produce output light beams of the substantially rectangular uniform intensity profile; and a light combining unit for combining light from said at least two optical paths to propagate along a common optical path.

38. The system of Claim 37, comprising a Spatial Light Modulator (SLM) accommodated in said common optical path.

39. The system of Claim 38, wherein the spatially separated light beams are arranged in a predetermined array corresponding to a pixel array arrangement of the SLM.

40. The system of Claim 38, wherein the tophat element assembly comprises an array of tophat elements each associated with a corresponding one of the light beams.

41. The system of Claim 36, wherein the beam shaping arrangement comprising at least one light splitting unit accommodated at the output of said at least one non-linear optical medium, respectively, and configured for splitting light emerging from the non-linear optical medium into a predetermined array of the spatially separated light beams for propagating along the respective at least one optical path; and comprising at least one tophat element assembly accommodated in at least one of said optical paths to allow passage of the spatially separated light beams therethrough and thereby produce output light beams of a substantially rectangular uniform intensity profile; and a light combining unit for combining light from said at least two optical paths to propagate along a common optical path.

42. The system of Claim 41, wherein the array of tophat elements is accommodated in the optical path associated with the at least one other light source.

43. The system of Claim 36, wherein said at least one pumping light source arrangement comprises a certain number of Surface Emitting Lasers, and said at least one other light source comprises a certain number of laser dies.

44. The system of Claim 43, wherein the light source system comprises first and second Surface Emitting Laser arrays producing light of different wavelengths, respectively, and operating as first and second pumping sources for the first and second non-linear optical media; and comprises the laser die array operating with a third different wavelength.

45. The system of Claim 44, wherein the first and second Surface Emitting Laser arrays operate in a non-visible spectral range, light emerging from the first and second non-linear optical media being of two different colors, respectively, of a visible spectral range.

46. The system of Claim 45, wherein the first and second Surface Emitting Laser arrays are Vertical Cavity Surface Emitting Laser (VCSEL) arrays; the first and second non-linear optical media are KTP and BBO crystals.

47. The system of Claim 35, comprising at least two focusing optics arrangement accommodated in said at least two optical paths.

48. The system of Claim 41, wherein the light source system comprises first and second Surface Emitting Laser arrays producing light of different wavelengths, respectively, and operating as first and second pumping sources for the first and second non-linear optical media; and the laser die array operating with a third different wavelength, the light splitting units being accommodated in first and second optical paths associated with the first and second Surface Emitting Laser arrays, and the tophat element assembly being accommodated in the optical path associated with the die array.

49. The system of Claim 35, wherein the light source system is configured to define three spatially separated optical paths associated, respectively, with the first light source including an array of Surface Emitting Lasers and producing an array of spatially separated light beams; the second light source including a light emitting diode (LED); and the third light source formed by an array of laser dies.

50. The system of Claim 49, wherein the first light source includes a non-linear optical medium to be pumped by the Surface Emitting Laser Array.

51. The system of Claim 50, comprising a light splitting unit accommodated at the output of the non-linear optical medium to split light emerging therefrom into an of the spatially separated light beams.

52. The system of Claim 49, comprising two focusing optics arrangement accommodated in the optical paths defined by the Surface Emitting Laser array and laser dies array, respectively; and light collection optics accommodated in the optical path defined by the LED.

53. The system of Claim 49, wherein the beam shaping arrangement comprises a tophat element accommodated in the second optical path to produce from a light beam generated by the LED a light beam of a substantially rectangular uniform intensity profile; and a light combining unit for combining light from said three optical paths to propagate along a common optical path.

54. The system of Claim 51, wherein the beam shaping arrangement comprises a tophat element accommodated in the second optical path to produce from a light beam generated by the LED a light beam of a substantially rectangular uniform intensity profile; and a light combining unit for combining light from said three optical paths to propagate along a common optical path.

55. The system of Claim 49, comprising a Spatial Light Modulator (SLM) accommodated in said common optical path.

56. The system of Claim 55, wherein the array of the spatially separated light beams produced by the light source corresponds to a pixel array arrangement of the SLM.

57. The system of Claim 54, wherein the tophat element assembly comprises an array of tophat elements each associated with a corresponding one of the light beams.

58. The system of Claim 1, comprising at least one multi-pixel diffractive optical phase mask configured to produce said structure light in the form of a predetermined pattern of spatially separated light beams.

59. The system of Claim 58, wherein the multi-pixel diffractive optical phase mask is configured to define a first array of pixels, each of said pixels being configured to define a second array of sub-pixels.

60. The system of Claim 58, wherein the beam shaping arrangement comprises at least first and second multi-pixel diffractive optical phase mask accommodated in a spaced-apart relationship along an optical path of light propagation through the system, such that the light beam emerging from the first mask is further split into an array of light beams by the second mask.

61. The system of Claim 58, comprising a focusing optics accommodated in an optical path of light propagating towards said at least one multi-pixel diffractive optical phase mask.

62. The system of Claim 60, comprising a focusing optics including at least two focusing assemblies accommodated upstream of said at least two multi-pixel diffractive optical phase masks, respectively.

63. The system of Claim 61, wherein the focusing optics comprises an array of lenses arranged in a plane perpendicular to an optical axes of the lenses, thereby producing a corresponding array of focused light beams propagating towards the multi-pixel diffractive optical phase mask.

64. The system of Claim 63, wherein the multi-pixel diffractive optical phase mask comprises an array of phase masks arranged in a plane parallel to the lenses arrangement, said array of the phase masks being configured such that each of the phase masks is aligned with a corresponding one of the focused light beams, thus forming an array of light beams of a predetermined size and gap between the adjacent beams.

65. An optical system configured to provide a desired illuminating light pattern, the system comprising a light source system configured and operable to produce structured light in the form of a plurality of spatially separated light beams; and a beam shaping arrangement comprising; the beam shaping arrangement being configured as a diffractive optical unit configured and operable to combine an array of the spatially separated light beams into a single light beam thereby significantly increasing intensity of the illuminating light.

66. The system of Claim 65, wherein the diffractive optical unit comprises an inverse Dammann grating assembly.

67. The system of Claim 65, wherein said diffractive optical unit is configured to affect the intensity profile of the beam to produce therefrom a light beam of a substantially rectangular uniform intensity profile.

68. The system of Claim 67, wherein said diffractive optical unit comprises a tophat element assembly.

69. The system of Claim 66, wherein the diffractive optical unit comprises a tophat element assembly to affect the intensity profile of the light beam to produce therefrom a light beam of a substantially rectangular uniform intensity profile.

70. The system of Claim 69, wherein said tophat element assembly is accommodated at the output of the inverse Dammann grating.

71. An optical system configured to provide a desired illuminating light pattern, the system comprising a light source system configured and operable to produce structured light in the form of a plurality of spatially separated light beams; and a beam shaping arrangement comprising; the beam shaping arrangement comprising an inverse Dammann grating assembly configured and operable to combine said plurality thereby significantly increasing intensity of the illuminating light.

72. An optical system configured to provide a desired illuminating light pattern, the system comprising a light source system configured and operable to produce structured light in the form of a plurality of spatially separated light beams; and an array of tophat elements each configured and operable for affecting the intensity profile of light passing therethrough to produce therefrom a light beam of the substantially rectangular uniform intensity profile.

73. An optical system configured to provide a desired illuminating light pattern, the system comprising a light source system configured and operable to produce at least one light beam; and a multi-pixel diffractive optical phase mask arrangement configured to produce from said at least one light beam structured light formed by a predetermined array of spatially separated light beams of substantially equal intensity value and profile, the multi-pixel diffractive optical phase mask arrangement being configured to define a first array of the pixels, each of said pixels being patterned to define a second array of sub-pixels, said structured light being in the form of the spatially separated light beams arranged in accordance with said second array of pixels.

74. An optical system configured to provide a desired illuminating light pattern, the system comprising a light source system configured and operable to produce at least one light beam; and a multi-pixel diffractive optical phase mask arrangement configured to produce from said at least one light beam structured light formed by a predetermined array of spatially separated light beams of substantially equal intensity value and profile, the multi-pixel diffractive optical phase mask arrangement comprising at least first and second multi-pixel

diffractive optical phase masks arranged in a cascaded manner such that the first mask splits the light beam into a first array of spatially separated light beams, and the second mask splits each of said spatially separated light beams into a second array of spatially separated light beams.

75. An optical system for use in patterning a surface, the optical system comprising a light source system configured and operable to produce at least one light beam; and a multi-pixel diffractive optical phase mask arrangement configured to produce from said at least one light beam structured light formed by a predetermined array of spatially separated light beams of substantially equal intensity value and profile.

76. The system of Claim 75, configured to produce said light beams with Gaussian intensity profile, the system being thereby operable to fabricate a lenslet array.

77. A light source system comprising an array of light source elements; and a control unit configured and operable to carry out a sequencing mechanism to sequentially actuate the light source elements in accordance with a predetermined pattern..

78. The system of Claim 77, wherein said pattern is such that at any given time only one group of the laser source elements is operative.

79. An optical system for use in scanning an image, the system comprising at least two light sources producing light of different wavelengths propagating along at least two optical paths, respectively, at least one of said at least two light sources being configured to produce structured light in form of an array of spatially separated light beams; a light combining arrangement for combining said at least two optical path into an output optical path; and a mechanical scanner accommodated in said output optical path.

80. An optical system for use in scanning an image, the system comprising at least two individually addressable light sources producing light of different wavelengths propagating along at least two optical paths, respectively, at least one of said at least two light sources being configured to produce structured light

in form of an array of spatially separated light beams each of a substantially rectangular uniform intensity profile; a light combining arrangement for combining said at least two optical path into an output optical path; and a mechanical scanner accommodated in said output optical path.

81. The system of Claim 80, wherein said at least one light source is configured to provide the individually addressable spatially separated light beams.

82. A method for producing illuminating light of a desired pattern, the method comprising producing structured light in the form of a plurality of spatially separated light beams; and applying beam shaping to the structure light, said beam shaping comprising passing the structured light through a diffractive optical unit configured and operable to carry out at least one of the following: (i) combining multiple light beams into a single light beam thereby significantly increasing intensity of the illuminating light; (ii) affecting the intensity profile of input light to provide the illuminating light in the form of an array of light beams of a substantially rectangular uniform intensity profile.

83. The method of Claim 82(i), comprising passing the multiple light beams through an inverse Dammann grating.

84. The method of Claim 82(ii) comprising passing the input light through a tophat element assembly.

85. The method of Claim 84, wherein said tophat element assembly comprises an array of tophat elements arranged in accordance with an array of the spatially separated light beams, such that each of the tophat elements affects the corresponding one of the light beams.

86. The method of Claim 85, wherein the tophat element is configured to affect the intensity profile of the corresponding light beam to produce therefrom the illuminating light beam of the substantially rectangular intensity profile corresponding to a geometry of the entire surface to be illuminated.

87. The method of Claim 85, wherein the tophat element is configured to affect the intensity profile of the corresponding light beam to produce therefrom

the illuminating light beam of the substantially rectangular intensity profile corresponding to a geometry of a single pixel from an array of pixels in a surface to be illuminated.

88. The method of Claim 85, wherein the tophat element is configured to affect the intensity profile of the corresponding light beam to produce therefrom the illuminating light beam of the substantially rectangular intensity profile corresponding to a geometry of a sub-array from an array of pixels in a surface to be illuminated.

89. A method for use in patterning a surface to produce a lenslet array, the method comprising producing at least one light beam; and passing said at least one light beam through a multi-pixel diffractive optical phase mask configured to produce from said at least one light beam structured light formed by a predetermined array of spatially separated light beams of substantially equal intensity value and Gaussian intensity profile.

90. A method for use in scanning an image, the method comprising: producing at least first and second light portions of different wavelengths propagating along at least two optical paths, respectively, at least one of the light portions being in the form of an array of spatially separated light beams corresponding to an array of image pixels; combining said at least two optical paths into a single output optical path and direct the array of light beams along said single output optical path to a mechanical scanner.